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New transfer of care initiative of electronic referral from hospital to community pharmacy in England: a formative service evaluation

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ABSTRACT

Objectives: To evaluate an electronic patient referral system from one UK hospital Trust to community pharmacies across the North East of England.

Setting: Two hospital sites in Newcastle-upon-Tyne and 207 community pharmacies.

Participants: Inpatients who were considered to benefit from on-going support and continuity of care after leaving hospital.

Intervention: Electronic transmission of an information related to patient's medicines to their nominated community pharmacy. Community pharmacists to provide a follow-up consultation tailored to the individual patient needs.

Primary and secondary outcomes: Number of referrals made to and received by different types of pharmacies; reasons for referrals; accepted/completed and rejected referred rates; reasons for rejections by community pharmacists; time to action referrals; details of the follow-up consultations; readmission rates at 30, 60 and 90 days post referral and number of hospital bed days.

Results: 2029 inpatients were referred over a 13-month period (1 July 2014–31 July 2015). Only 31% (n=619) of these patients participated in a follow-up consultation; 47% (n=955) of referrals were rejected by community pharmacies with the most common reason being 'patient was uncontactable' (35%, n=138). Most referrals were accepted/completed within 7 days of receipt and most rejections were made >2 weeks after referral receipt. Most referred patients were over 60 years of age and referred for a Medicines Use Review (MUR) or enrolment for the New Medicines Service (NMS). Those patients who received a community pharmacist follow-up consultation had statistically significant lower rates of readmissions and shorter hospital stays than those patients without a follow-up consultation.

Conclusions: Hospital pharmacy staff were able to use an information technology (IT) platform to improve the coordination of care for patients transitioning back home from hospital. Community pharmacists were able to contact the majority of patients and results indicate that patients receiving a follow-up consultation may have lower rates of readmission and shorter hospital stays.

Strengths and limitations of the study

- This study provides a detailed description of how an electronic referral system between hospital and community pharmacies across the North East of England was implemented.
- This study demonstrates that inpatients can be effectively referred to their nominated community pharmacist and receive a follow-up consultation tailored to their needs after discharge from the hospital.
- The study demonstrates that routine data collection during this evaluative period requires critical analysis and additional qualitative work to understand fully the operational and implementation aspects of the service, for example, complex reasons for the recorded rates of non-completion of referrals.
- There are no routinely recorded data at the community pharmacist follow-up consultation to allow specific economic, clinical or humanistic outcomes to be determined. However, service continual improvements are being made towards achieving this.
- A well-structured clinical trial of this intervention is required to investigate the impact on patients as they transition between healthcare settings.

INTRODUCTION

The continuity of patient care when transitioning from one healthcare setting to another is a national priority.[1] A range of interventions have been designed, trialled and tested to improve the quality and safety of this transfer process.[2–6] Successful interventions have incorporated activities such as medication reconciliation; quick, clear and structured discharge summaries; discharge planning; follow-up between hospital and

community providers; electronic discharge notifications; and web-based access to discharge information for general practitioners (GPs).[7] In the design of such interventions, community pharmacists have been recognised as accessible and valuable contact points for patients in primary care to provide additional advice and counselling, particularly on medication-related issues and the management of chronic conditions.[8–11] A recent systematic review highlighted how community pharmacists could help identify and rectify medication errors, thus providing a significant impact on improving outcomes.[8] These community pharmacy interventions included activities to improve the quality of information; coordination of care and communication between care settings.[8] Other reported outcomes that could be realised include: improved patient understanding of their medication and condition,[5 12] improved communication of accurate medication-related information between care settings[5] and the potential to reduce morbidity and mortality associated with targeted conditions.[11 13]

In 2012, the Royal Pharmaceutical Society (RPS) issued professional guidance in its publication *'Keeping patients safe when they transfer between care providers—getting the medicines right'* on the core principles that underpin the safe transfer of information related to medicines for a patient transferring between care providers in any setting.[14] Hospital and community sites across the UK have adopted this guidance by designing services and initiatives to specifically improve patient transitions. In a subsequent report,[15] 30 early adopter sites provided information to the RPS on their service designs; the barriers they faced; their results and how the initiatives will sustain change and facilitate good practice locally going forward. Of these sites, half incorporated a specific role for community pharmacists within their transfer of care programmes,[15] and three were used as exemplar case studies by the RPS in their most recent toolkit[16] to support hospital referral services to community pharmacy. This document was issued to aid commissioners and pharmacy leaders to design and implement an effective referral system.[16] However, despite the valuable structure and support this document provided at an aerial level, no evaluation has been conducted of a transfer of care initiative incorporating active involvement of community pharmacists since the RPS professional guidance was issued.[14] We evaluated the transfer of care initiative in the North East of England and North Cumbria, and present aspects of its achievement from two specific hospital sites where the initiative has been delivered for the longest period of time and generated the most service activity data.

METHODS

Description of the service intervention

The transfer of care initiative, the first of its kind in the UK, was launched in July 2014. It was a collaborative project between Newcastle-upon-Tyne National Health Services (NHS) Foundation Trust, North of Tyne Local Pharmacy Committee (LPC) and Pinnacle Health Partnership LLP (provider of *PharmOutcomes). PharmOutcomes* is a web-based platform routinely used by community pharmacies in the North East and North Cumbria to record data on service provision. The three parties involved in the collaboration created new hospital and community pharmacy referral templates within *PharmOutcomes* to facilitate a secure method of electronic transfer of information related to medicines between hospital and community pharmacies.[16] Hospital pharmacy staff were shown how to use *PharmOutcomes* by senior pharmacy staff, and two launch events were organised for hospital and community pharmacy staff to inform and answer any questions about the electronic patient referral process. Community pharmacy staff were also provided with further information in paper-based and electronic forms, and screenshots to help visualise the content of information that would be received by the community pharmacists. Newcastle-upon-Tyne hospitals were the first hospitals to make electronic referrals to community pharmacies, and it is their service that has been analysed; however, following creation of an Academic Health Science Network (AHSN) transfer of care initiative (October 2014), eight other hospitals in the North East and North Cumbria are now also making referrals using *PharmOutcomes*. The service intervention has been described in further detail using the Template for Intervention Description and Replication (TIDier) checklist and guide (see online supplementary file 1).[17] Since its conception, the service has been developed and the changes have been itemised (see online supplementary file 2). These will be referred to as findings are discussed.

Referrals sent from the hospital system

Hospital pharmacy staff, which include pharmacy technicians and clinical pharmacists (approximately n=30 across the two hospital sites) identified patients who, in their clinical judgement, would benefit from a follow-up consultation with a community pharmacist. These included patients who were on four or more medicines or had a number of medicines changed during their hospital stay. These patients were approached, informed about the service, and asked if they would like to participate and nominate a community pharmacy of their choice. At the time of the patient's discharge, a member of hospital pharmacy staff (pharmacy technicians and clinical pharmacists) would (a) log into *PharmOutcomes,* (b) populate various patient demographic fields including name; date of birth; postcode; ethnicity; NHS number; GP details, (c) select a community pharmacy (nominated by the patient) from a drop-down list and (d) recommend what additional pharmaceutical service, advice or general care might be useful for the patient at the follow-up consultation ('Reason for referral' field). Finally, the contact details of the member of staff making the referral were also recorded.

Referrals received by the community pharmacy system

Community pharmacists could participate on a voluntary basis, as no contractual or service reimbursement arrangements were made. Community pharmacists had the choice of either 'accepting' or 'rejecting' the referral sent from the hospital. From December 2014, if a referral was rejected, the community pharmacist was prompted to provide a reason from the drop-down list, which included 'housebound patient', 'uncontactable patient' and 'other'. If 'other' was selected, then further details were required in the free text box provided. The drop-down list was changed in June 2015 to increase the options available and to force the selection of a reason for rejection, removing 'housebound patient' as the default. Alternatively, the community pharmacist could choose to 'accept' the referral and, thus, contacted the patient to arrange a follow-up consultation. Further details on what medication-related questions were asked to the patient during the consultation were collected for example, was the patient's understanding of how to take medications checked?; has the patient experienced an adverse drug reaction (ADR)? Any pharmaceutical service(s) that were provided to the patient needed to be recorded by the pharmacist for example, Medicines Use Review (MUR) or stop smoking service, as well as any support service(s) for example, medicines reconciliation or review of a compliance aid. Once the consultation had been completed, the pharmacist was required to enter further details in *PharmOutcomes* under the section 'Complete the referral'. These details included name and address of the community pharmacy; name and professional registration number of the community pharmacist; the reported long-term condition(s) of the patient (cardiovascular disease; respiratory; diabetes and other). If a community pharmacist had not acknowledged the referral in *PharmOutcomes* nor registered any action taken, then the status of that referral remained recorded as 'Referred (no action)' on the system. Data on community pharmacy activity were captured through *PharmOutcomes*.

Data collection

Service activity data

We evaluated this service from 1 July 2014 to 31 July 2015. All patient identifiable information was removed; however, patient age, ethnicity and postcode were included. The reasons for referrals by hospital staff, the details of the community pharmacies to which referrals were sent, and the subsequent acceptance/rejection and completion rate of these referrals were extracted. Community pharmacies were categorised by type as follows: national large chain multiple, small regional chain multiple, supermarket pharmacy and independent pharmacy. The referral history was tracked to investigate how many referrals were actioned, that is, 'accepted', 'completed' or 'rejected' within 7; 7–14; and >14 days. Where referrals were rejected, the reasons provided were collated and analysed. Details on the long-term conditions of the patients referred, their specified medication regimen, the medicine-related questions asked by the pharmacist at the follow-up consultation, any general patient feedback as recorded by the pharmacist, any reported ADRs and the advice given as a consequence, and any additional pharmaceutical or support services that was provided, were also collated and analysed.

Hospital readmission rates and number of bed days

On 23 October 2015 the NHS numbers of all patients who participated in the electronic referral service between 1 July 2014 and 30 June 2015 were extracted by the hospital team and checked to see if they had been readmitted (all-cause admissions) post electronic referral and, if so, what specific dates they had been subsequently admitted and discharged on. Patients participating in the service after 30 June 2015 would not have had readmission data at 90 days post referral, hence the shorter analysis period was chosen. The data were anonymised and sent to an independent researcher (HN). The patient population was categorised into two groups: one received a community pharmacist follow-up consultation (completed referrals) and one did not (either accepted but not completed, referred (no action), and rejected referrals). The number of readmissions at 30, 60 and 90 days post electronic referral was collated and number of bed days was calculated from length of hospital stays.

Data analysis

Quantitative data relating to the service activity was analysed using descriptive statistics and converted to percentages where appropriate to represent proportions. Text entered into free text boxes were collated, manually coded and then analysed. Readmission was defined as a stay of at least 12 hours. Association between the outcome of referrals (accepted, remain referred, completed, rejected) and type of pharmacy (eg, supermarket, independent, etc) were examined using a χ^2 test. A generalised estimating equation model was used to examine the association between readmission rate and whether patient received consultation or not from the community pharmacies. As repeated readmissions per patient at 30, 60 and 90 days are likely to be correlated, this model accounted for intrapatient correlation between the repeated data. Similarly, number of days admitted were analysed using linear model with a structured covariance matrix to account for repeated readmission data per patient.

Discussion within the project team, together with hospital research ethics leads and on consultation of the NHS Health Research Authority guidance[18] identified the study components to be either audit or service evaluation and therefore did not require ethical approval.

RESULTS

Service activity data

A total of 2029 hospital inpatients consented to participate in the transfer of care service during the evaluative period and were referred to their nominated community pharmacy. Of these, 97.9% (n=1986) referrals were generated by pharmacy technicians. The spread of these referrals over the 13 months are shown in figure 1. This equated to ~156 referrals being made each month to 207 community pharmacies across the North of Tyne, that is, ~0.75 referrals per month per pharmacy. The rate of referrals fluctuated throughout the year, but generally numbers increased with the highest occurring in July 2015.

Community pharmacies were categorised according to Bush *et al*: supermarket; multiple (≥200 outlets); large chain (>20 outlets but <200); small chain (≤20 outlets but >5); independent (≤5 outlets).[19] Table 1 shows how many referrals were received by each pharmacy type and whether these referrals were accepted, rejected or completed. Overall, table 1 shows that outcomes of referrals varied significantly among the various types of pharmacies ($p<0.001$). This pattern was consistent for each outcome (accepted, remain referred, completed, rejected). Completion of referrals was highest for multiples and significantly higher than any other type of pharmacy. Rejection was highest among small chain pharmacies and was significantly higher than rejection rates from all other types of pharmacy.

The decision to either accept or complete the referrals was largely carried out within 7 days of the community pharmacist receiving the referral (56.1% and 66.2%, respectively) as shown in online supplementary file 3. However, most rejections were made >7 days post discharge (66.9%).

Of the total 2029 referrals, 45.3% (n=955) were rejected by the community pharmacy. The 389 rejections that occurred after December 2014 were accompanied with a reason, which are listed in online supplementary file 4. The most common reason for rejection was that the patient was uncontactable (35.5%, n=138) or that the patient was housebound (19.3%, n=75). However, after a change made to the *PharmOutcomes* template in June 2015 that removed 'housebound' as the default reason for rejecting a referral (see online supplementary file 2), the rate of rejection for this reason dropped from 39% to 14%.

The age range of patients who agreed to receive a referral and the reasons for these referrals, of which there could be multiple reasons, were recorded by hospital pharmacy staff (table 2).

Only 30.5% (n=619) of referrals made resulted in a community pharmacist 'accepting' and recording the 'completion' of the follow-up consultation. Table 3 details the long-term condition or treatment of patients receiving a follow-up by a community pharmacist, the medication-related information they were provided with during the consultation, any advice on ADRs and any additional pharmaceutical or support service that was also delivered.

The majority of patients that were followed up were those with a cardiovascular or respiratory disease. Most patients received information from the community pharmacist on their medication (90.0%, n=557), doses (87.8%, n=543), occurrence of side effects (84.2%, n=521) and their conditions (73.8%, n=457). Most patients (73.8%, n=457) did not report an ADR to the community pharmacist during the consultation. However, of those who did, 17.1% (n=106) were considered manageable and non-harmful to the patient, and thus, the patients were advised to continue taking their medication as prescribed. Most patients did not receive any additional pharmaceutical or support service (53.4%, n=331), but many received an MUR (46.6%, n=288) and/or were enrolled on the New Medicines Service (NMS) (38.9%, n=241). Of these patients who

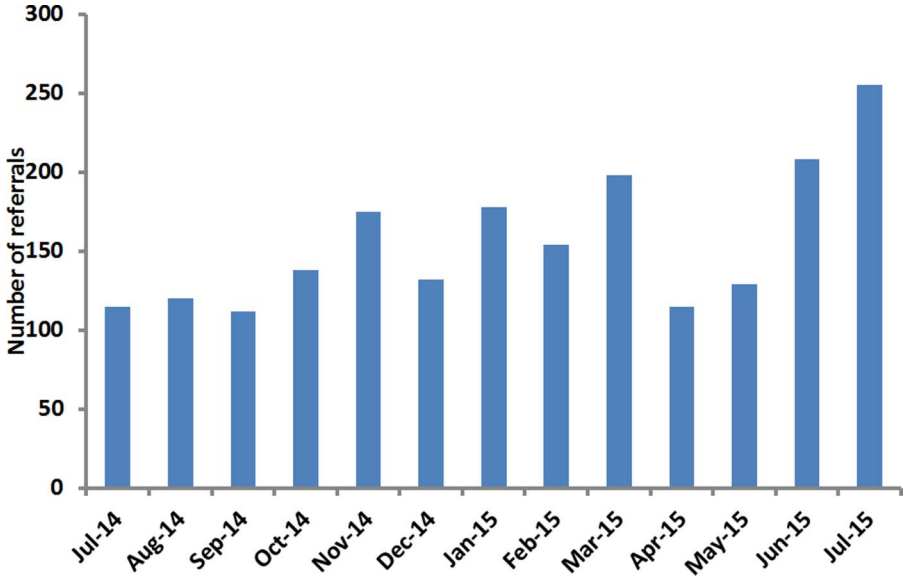

Figure 1 The number of referrals made over the evaluative period.

Table 1 The number of referrals received across the categories of community pharmacies[a–d] and the subsequent outcomes of those referrals

Outcome of referrals	Type of pharmacy: Independent n (%)	Multiples n (%)	Supermarket n (%)	small chain n (%)	Total n (%)	P value
Accepted	39 (7.7)[a,c*]	70 (6.6)[b,c*]	26 (20.3)[c,d*]	33 (9.6)	**168 (8.3)**	**0.009**
Remain referred	108 (21.6)[a,b*; a,d*both]	168 (15.8)[b,d*]	18 (14.1)[c,d*]	4 (1.1)	**298 (14.7)**	**<0.001**
Completed	128 (25.5)[a,b*; a,c*]	396 (37.5)[b,c; b,d all*]	20 (15.6)	75 (21.9)	**619 (30.5)**	**<0.001**
Rejected	226 (45.1)[a,d*]	423 (40.0)[b,c; b,d both*]	64 (50.0)[c,d*]	231 (67.3)	**944 (46.5)**	**<0.001**
Total	**501 (24.7)**	**1057 (52.1)**	**128 (6.3)**	**343 (16.9)**	**2029 (100.0)**	**<0.001**

*Denotes statistically significant difference at p<0.05 between pharmacy types.

Table 2 The age of the patients and reasons for the referrals made by hospital pharmacy staff to community pharmacy during the evaluative period. (n=2029)

Characteristics of referrals	Number (%)
Age of patient (years)	
<10	47 (2.3)
11–19	14 (0.7)
20–29	24 (1.2)
30–39	65 (3.2)
40–49	183 (9.0)
50–59	270 (13.3)
60–69	497 (24.5)
≥70	930 (45.8)
Reason for referral	
MUR	663 (32.7)
New medication(s) issued in hospital	365 (18.0)
Compliance aid issue	168 (8.3)
Changed dose(s) in hospital	148 (7.3)
Stopped medication(s) in hospital	142 (7.0)
Compliance issues	77 (3.8)
MUR/New Medicines Service (NMS)	73 (3.6)
Technique issue	57 (2.8)
Smoking cessation follow-up	43 (2.1)
NMS	30 (1.5)
Side effect issue	26 (1.3)
Need for monitoring	24 (1.2)
Check on well-being	16 (0.8)
Repeat dispensing query	10 (0.5)
Delivery service query	10 (0.5)
Special formulation of medication	4 (0.2)
No reason provided	601 (29.6)

MUR, medicines use review.

were provided with a follow-up consultation, 40.4% (n=250) provided feedback via the pharmacist. Just over half of these patients reported that the information was a good reconfirmation of the information provided within hospital and, at discharge (52.4%, n=131), 90 (36%) of the patients expressed their appreciation for the contact with the community pharmacist and the usefulness of their advice and/or service provided through this initiative; a small number (4.8%, n=12) refused or were reluctant to receive any form of follow-up consultation by the community pharmacist in the future. In the remainder of cases (6.8%, n=17), pharmacists recorded how the patient was either too ill to be spoken to or that they consulted with their carer instead.

Hospital readmissions and number of bed days

There were a total of 1386 hospital patients who received electronic referrals to community pharmacy during the period 1 July 2014 and 30 June 2015; of these, 501 (36.1%) had a record of receiving a follow-up consultation by a community pharmacist ('completed' referral) (table 4). Of the remaining 885, 278 (20.0%) patients are unlikely to have received a follow-up community pharmacist consultation as the status of their referral on the *PharmOutcomes* system remained either 'referred (no action)', 'accepted' but not completed. A total of 607 (43.8%) were 'rejected' by the community pharmacist. Table 4 displays the readmissions rates and number of bed days of patients who either received or did not receive a follow-up community pharmacist consultation. The odds of readmission were found to be significantly higher among those who did not receive a follow-up consultation from the community pharmacy. This result is consistent across the three readmission time points (30, 60 and 90 days). Over the same time period, the 30 day readmission rate was 13.2%, which is higher than that of the group of patients who received the community pharmacist follow-up and lower than that of the patients who did not receive the community pharmacist follow-up. This correlation appears to indicate that hospital pharmacy staff were targeting patients at greatest risk of early readmission to hospital. Among readmitted patients, the average duration of hospital stay at any time point (30, 60 or 90 days) was at least 5 days less for those who received consultation.

DISCUSSION

This transfer of care service addressed a recognised patient need as they transition between care settings. Our findings show how an electronic solution, in this case *PharmOutcomes*, can be employed to facilitate the transfer of information between hospital and community pharmacy teams to improve the coordination of care as patients transfer between care settings. We have provided a detailed description of how this specific electronic

Table 3 The details of the referrals that were followed up by community pharmacists and recorded as completed. (n=619)

Completed referral details	Number of patients (%)
Long-term condition/treatment of patient	
Cardiovascular disease (CVD)	328 (53.0)
Respiratory	126 (20.4)
Diabetes	28 (4.6)
CVD and diabetes	22 (3.5)
Pain	11 (1.8)
Cancer	9 (1.4)
Anticoagulant	8 (1.3)
CVD and other	7 (1.1)
Diabetes and other	3 (0.5)
Hypertension	1 (0.2)
None specified	76 (12.3)
Information provided	
More information on medication(s)	557 (90.0)
Dose check	543 (87.8)
More information on condition	457 (73.8)
Side effect check	521 (84.2)
Advice provided on reported ADR	
Manageable and non-harmful—patient to continue	106 (17.1)
Refer to GP	33 (5.4)
Patient stopped taking medication	18 (2.9)
Refer to hospital	5 (0.8)
Not applicable	457 (73.8)
Pharmaceutical/support service provided	
MUR	288 (46.6)
NMS	241 (38.9)
Home delivery service	138 (22.3)
Compliance aid	79 (12.8)
Repeat dispensing	53 (8.5)
Medicines reconciliation	28 (4.5)
Smoking cessation	25 (4.0)
Discussion	23 (3.7)
Review of dosage form	17 (2.7)
Review of compliance aid	13 (2.1)
Influenza vaccination	12 (1.9)
Medication administration record	7 (1.1)
Large print labels	7 (1.1)
Easy open tops	6 (1.0)
Healthy living advice	6 (1.0)
Appliance use review	1 (0.2)
None	331 (53.4)

ADR, adverse drug reaction; GP, general practitioner; MUR, medicines use review; NMS,New Medicines Service.

referral process worked in practice, so as to help inform future service designers and implementers. We also provide information of the ongoing changes made during the evaluation period which aimed to increase rates of referrals, completion and reduce rejections. Additional changes have and are being made in response to continuing evaluation of the service delivery and activity. We found that community pharmacy engagement, through linking with local pharmacy committees and regional managers of large multiples, along with close working relationships with the developers of the eReferral platform, were key to designing, adapting and delivering a successful process.

Over the 13-month evaluative period, 2029 patients were referred to their nominated community pharmacy. This is a modest number of referrals considering there were no eligibility criteria to restrict activity. Ramsbottom *et al*[20] also report a very small proportion of eligible inpatients (3.2% of over 10 000 potential patients) were identified to receive referrals to community pharmacists for domiciliary MURs. The main reasons put forward by the authors for these low referral rates were that the service was new and not embedded into practice, hospital staff had other competing priorities and the patients' poor health were reported as barriers to making referrals.[20] Further qualitative data collection from hospital pharmacy staff could explore the reasons for low referral rates in our study and aid in the design of solutions to increase activity. Qualitative data from community pharmacists would also explore the low completion rate, and investigate the facilitators and barriers to the embedding of this service into normal practice. The Normalisation Process Model, as proposed by May[21] would be an appropriate theoretical framework to evaluate the process and context of implementation.

Unfortunately, we did not record the details of all patients who were approached by hospital pharmacy staff and offered an electronic referral. It would be interesting to further investigate why patients decided to refuse these referrals. A recent study found that 32% of elderly patients eligible to receive a visit from a pharmacist post hospital discharge refused. The most common reasons stated in this study were the lack of perceived benefit of the interaction with a community pharmacist and preference to see their GP.[20] Yu *et al*[22] also found that once their patient population was made aware of the availability and benefits of a post discharge pharmacist home medicines review, the majority of patients were willing to participate.[22]

Most referrals were sent to multiple chain pharmacies (52.1%, n=1057) as nominated by inpatients. Multiple chain pharmacies made up 50.2% of the total number of pharmacies in the area (104 out of 207). This category of pharmacy also had the highest completion rate of eReferrals, significantly higher than all other pharmacy types (35.6%, n=376). The supermarket pharmacies received the least number of eReferrals (6.3%, n=128) and also had the lowest completion rate (15.8%, n=20), which was statistically lower than all other pharmacy types. Further investigation is needed to explore the motivators and barriers of pharmacists to accept/refuse eReferrals and whether the type of pharmacy at which the pharmacist was based influenced their decision. Work carried out by Jacobs *et al*[23 24] may provide a framework in evaluating if and how the culture in various community pharmacy organisations impact their performance in pharmaceutical services. Another

Table 4 The readmissions and number of bed days of patients who received a follow-up community pharmacist consultation and of patients who did not

Patient cohort	Number of readmissions post electronic referral at			Number of bed days for readmitted patients at		
	0–30 days n (%)	31–60 days n (%)	61–90 days n (%)	30 days mean±SD	60 days mean±SD	90 days mean±SD
Received a CP consultation (n=501)	29 (5.8)	17 (3.4)	18 (3.6)	7.2±1.0	7.2±6.4	7.3±6.7
Did not receive CP consultation (n=885)	142 (16.0)	84 (9.5)	83 (9.4)	13.1±17.4	13.7±19.2	12.5±16.6
OR and 95% CIs (N=1386)	3.1 (2.1 to 4.7)	3.0 (1.8 to 5.1)	2.8 (1.6 to 4.7)			
Mean differences and 95% CIs (N=373)				−5.8 (−12.7 to 1.0)	−6.5 (−15.4 to 2.4)	−5.2 (−13.9 to 3.5)

CP, community pharmacist.

evaluation of a pharmaceutical service using *PharmOutcomes* for routine data collection suggested that low recorded completion rates on this information technology (IT) platform may have been due to the community pharmacists not logging onto the system and documenting their actions.[25] In which case the referrals that are listed as 'remain referred' or 'accepted' may have actually been formally completed or rejected. Most eReferrals were 'accepted' or 'completed' within 7 days of receipt, whereas most rejections occurred after 7 days. It is important to understand this time lag and whether the delay was due to events not under the community pharmacist's control, for example, multiple attempts to contact the patient. The most highly reported reasons for rejections of referrals by the community pharmacists was that the patient was uncontactable (35.1%, n=138). Specific reasons for this needs to be explored to understand if this is an issue with the service design and delivery, for example, patients may not answer unidentifiable numbers; patients may provide erroneous contact details instead of refusing a referral, etc. A considerably large number of pharmacist rejections in our study were due to the patients being housebound (19.3%, n=75); however, it was observed that rates of patients registered as 'housebound' dropped from 19% of rejections to 14%, after the change was made on the electronic template. Where the referral had been sent to a pharmacy which was not routinely used by the patient (12.4%, n=48), again further understanding is required to check if this is something that could be further improved in the design of the service or patient deflection. It is possible that patients newly prescribed medicines who were not taking medicines prior to admission to hospital (eg, post myocardial infarction (MI)) and, therefore, not known by the community pharmacy had their referral rejected when their need for support was greatest. Further detailed analysis is therefore warranted.

The majority of patients that consented for an electronic referral were elderly (60 years and over, 70.3%, n=1427) and the most common reasons that a referral was made by hospital staff were for medication–related problems (MUR; initiation/cessation/changed medicine or dose in hospital; compliance aid issue; medication compliance issue). The patients who ultimately received a follow-up consultation from a community pharmacist were those with reported cardiovascular disease (53.0%, n=328) or a respiratory condition (20.4%, n=126). This may reflect the areas in the hospital being targeted by clinical pharmacy staff; however, empirical research is required to investigate this. These patient demographics may be useful to consider in defining eligibility criteria for the referral of future patients. Within the follow-up consultation pharmacists had the opportunity to provide information on medication, dosing, medical condition, side effects/ADRs and their subsequent management. Most of the patients were not provided with an additional pharmaceutical or support service (53.4%, n=331), but 46.6% (n=288) of patients received an MUR and/or initiated the NMS (38.9%, n=241).

Routine data collection does not include a measure that meets any economic, clinical or humanistic outcomes model;[26] this means that the impact and value of the intervention cannot be understood. Despite the tailoring of the community pharmacist follow-up consultation to the patient's expressed need, no subsequent outcome data associated with the tailored pharmaceutical care and/or service are routinely recorded to demonstrate the effect. Where MURs were performed or NMS initiated, there is no inclusion of the actions and recommendations of the community pharmacist within routine data collection on *PharmOutcomes*. The information for these two specific services has their own separate documentation and recording process. Inclusion of this information with the eReferral service data may provide further detail on the impact of the community pharmacist intervention on patient outcomes, for example, medication or condition-related issues and advice, referrals onto GPs for monitoring or consultation. Future evaluations should aim to identify a specific parameter that can be used directly or as a proxy to measure economic, humanistic or clinical outcomes.

Of the relatively small proportion of patients who provided ad hoc feedback via the pharmacist about the service, just over half felt that the information received reconfirmed what they had been previously told in hospital; some patients appreciated this and found it useful. Our study found that those patients who received a follow-up community pharmacist consultation as a result of a hospital eReferral demonstrated statistically lower readmissions and shorter hospital stays as a result of any readmission. However, further critical analysis of this positive association, for example, explore the individual reasons for readmissions, use of other healthcare services, etc, is required to substantiate a causal link.

The service aimed to improve the transition of the patient between care settings which would be best tested via a randomised control trial. However, prior to carrying this out a feasibility study is required. This work would determine how best to design the future trial and identify primary and secondary outcomes that would be feasible to collect and allow assessment of effectiveness.

The strengths of this study are that it specifically describes the implementation and operation of an electronic referral process from hospital to community pharmacy. We have highlighted possible areas for further improvement, but feel that the lessons learnt so far are relevant and valuable to those considering the implementation of a similar process. The marrying of service activity with the developmental changes also provides context to the critical reader in understanding context and to the service planner of the continual monitoring and malleability of the service.

A weakness of this evaluation is that there is no test for fidelity of service delivery and implementation. An investigation of how well hospital and community pharmacy staff adhere to the recommended process might provide further insights into the relatively low referral and completion rates that have been recorded on *PharmOutcomes*.

The systematic review by Hesselink *et al*[7] found that interventions that exhibited specific components, for example, medicines reconciliation, showed statistically significant effects in favour of the intervention, that is, reconciliation reducing the percentage of unreconciled medication after discharge.[7] A future clinical study should ensure service data collection is appropriate to allow assessment of intervention effect. The detailed intervention description provided here will allow better understanding of facilitators and barriers to outcomes that will be recorded. This study also highlights a deficiency of the intervention itself: the lack of comprehensive discharge information routinely accompanying the referral. Another recent systematic review concluded that those interventions that aimed to identify and rectify drug-related problems showed the most statistically significant benefit.[8] However to facilitate this, there needs to be sufficient medication-related information transferred between healthcare settings. With the recent announcement that summary care records, an electronic patient record derived from patients' GP records will be provided more widely to community pharmacists,[25] it is anticipated that the information gradient between primary and secondary care will be reduced.

CONCLUSIONS

Patients in hospitals can be electronically referred to their nominated community pharmacy upon discharge from hospital in order to receive a follow-up consultation tailored to their specific need. We have shown that multiple stakeholders from the hospital, community pharmacy organisations and IT system developers working collaboratively could design and implement an electronic eReferral service from hospital to community pharmacy. Electronic referral non-completion rates during the study period appear to be high. This may be due to this period encompassing the launching and embedding of such a pioneering service. Early indications are such that the patients referred from hospital, who receive a follow-up consultation from their community pharmacist, may have lower rates of readmission and shorter hospital stays.

A feasibility study will identify how and which outcomes will allow effectiveness of this intervention to be measured.

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Contributors NWW, AG and SB were involved in the design and implementation of the intervention. HN designed the service evaluation, and HN, NA and AK analysed the data. All authors discussed the results and interpretation. All authors were involved in drafting the initial text for the report and revising drafts prior to publication, and all approved the submission.

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New transfer of care initiative of electronic referral from hospital to community pharmacy in England: a formative service evaluation

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